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EPA 'Safe' Limits for Pesticides on Food Geared Toward Adults, Not Kids

The U.S. Environmental Protection Agency has, in most cases, failed to take children into account when setting allowable limits for pesticides. As a result, children who eat conventional produce may be exposed to unsafe levels of these chemicals.

By **Dr. Joseph Mercola**

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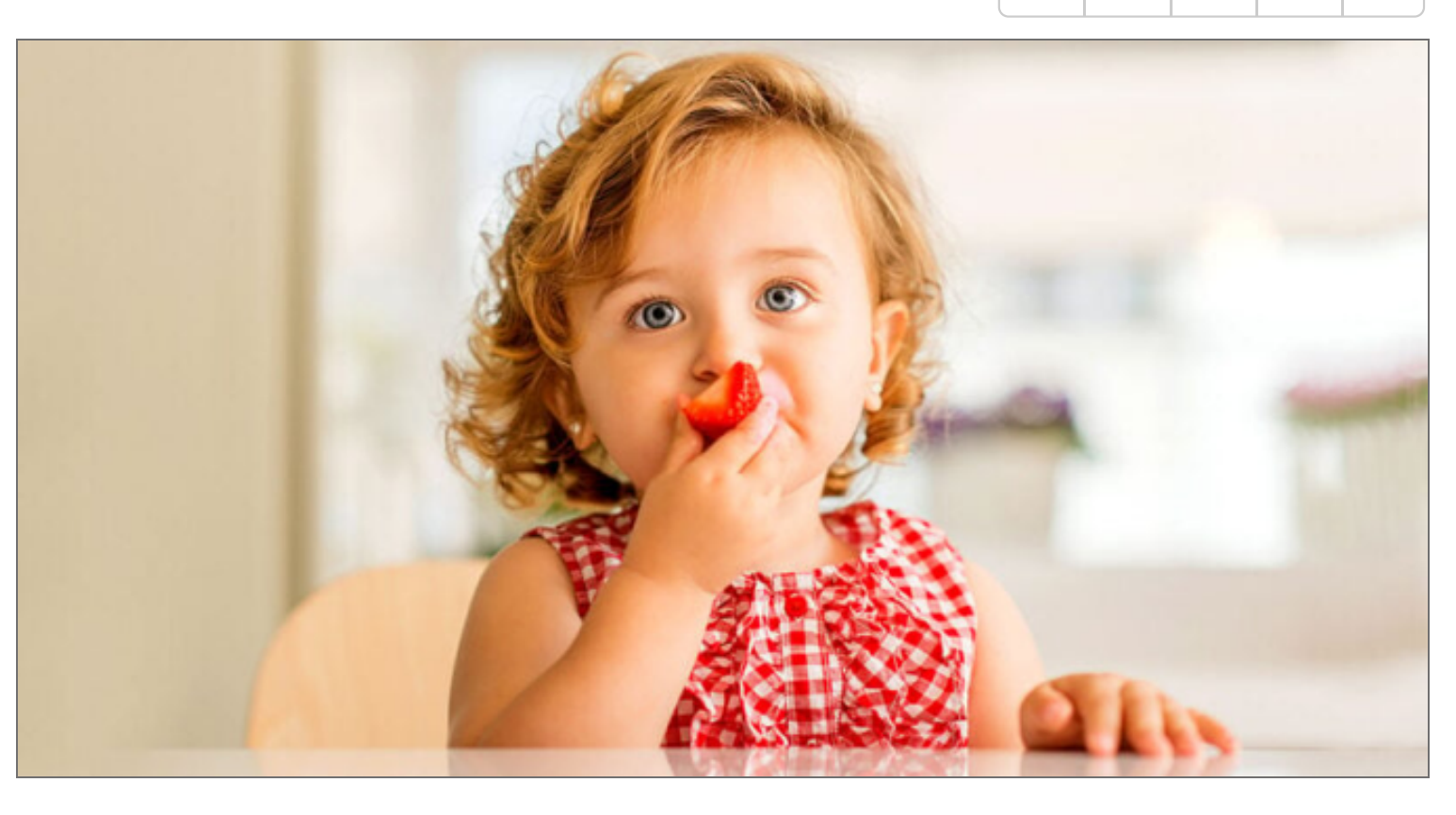

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Story at a glance:

- Fresh produce, whether organic or conventionally grown, is one of the healthiest food choices you can make. Organic produce gains an edge, however, because it tends to be more nutritious, tastes better and, importantly, does not contain pesticide residues like conventional produce does.
- An investigation by the Environmental Working Group (EWG) published in 2020 concluded that the U.S. Environmental Protection Agency (EPA) has, in most cases, failed to take children into account when setting allowable limits for pesticides. As a result, children who eat conventional produce may be exposed to unsafe levels of these chemicals.
- If your budget prevents you from buying organic food 100% of the time — or there's not an adequate selection in your area — it's useful to know which conventional foods are the most contaminated and therefore the most important to buy organic.
- Since 2004, the EWG has released "Dirty Dozen" and "Clean 15" lists for produce, based on testing data from the U.S. Department of Agriculture (USDA) and the U.S. Food and Drug Administration (FDA). In 2023, strawberries, spinach, kale, collard, mustard greens, peaches, pears, nectarines, apples, grapes, bell and hot peppers, cherries, blueberries and green beans had the highest levels of pesticides.
- Blueberries and green beans are new additions to the Dirty Dozen list. Nearly 80% of blueberry samples contained two or more pesticides, including malathion, which has toxic effects on the human nervous system and is classified as a probable human carcinogen.

Fresh produce, whether organic or conventionally grown, is one of the healthiest food choices you can make. Organic produce gains an edge, however, because it tends to be more nutritious, tastes better and, importantly, does not contain pesticide residues like conventional produce does.

In fact, the number one reason people go organic is to avoid pesticides and other chemicals, and 40% of Americans consume organic food either all of the time or occasionally.

If your budget prevents you from buying organic food 100% of the time — or there's not an adequate selection in your area — it's useful to know which conventional foods are the most contaminated and therefore the most important to buy organic.

Since 2004, the EWG has released a "Dirty Dozen" list for produce, based on testing data from the USDA and the FDA. These are the foods most heavily contaminated with pesticides. They also release a "Clean 15" list of the produce with the least amount of pesticides.

The dirty dozen list of fruits and vegetables for 2023
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DIRTY DOZEN CLEAN 15

Many toxins remain in produce after washing and peeling

The USDA and FDA use slightly different techniques when testing produce for contaminants. The USDA peels or scrubs and washes produce before testing, whereas the FDA only removes surface dirt.

The fact that washed and/or peeled produce still test positive for pesticides is telling, to say the least. This means you simply cannot avoid these toxic chemicals by being diligent about rinsing and peeling your fruits and vegetables. The only way to avoid them is to buy organic produce, as organic standards forbid the use of most synthetic and manmade pesticides.

EPA's 'allowable levels' may be unsafe for children

As for why you want to avoid both pesticides and herbicides, there's ample evidence showing that agricultural chemicals can have adverse health effects — especially in children — and that these negative impacts may even cancel out some of the health benefits you'd normally expect from fresh fruit and vegetables.

What's more, an investigation by the EWG published in 2020 concluded that the EPA has, in most cases, failed to take children into account when setting allowable limits for pesticides. As a result, children who eat conventional produce may be exposed to unsafe levels of these chemicals.

As reported by the EWG:

> "Research from Harvard University shows that consuming fruits and vegetables with high levels of pesticide residues may lessen the benefits of fruit and vegetable consumption, including protection against cardiovascular disease and mortality.
>
> "A recent EWG investigation published in the peer-reviewed journal Environmental Health found that the EPA has failed to adequately protect children from pesticides.
>
> "For almost 90% of the most common pesticides, the agency has neglected to apply the Food Quality Protection Act–mandated children's health safety factor to the allowable limits.
>
> "The threats pesticides pose to children's health have been known since at least 1993 — 30 years ago — when the National Academies of Science published a landmark study warning of inadequate oversight.
>
> "The American Academy of Pediatrics recommends that parents concerned about their children's exposure to pesticides consult EWG's Shopper's Guide.
>
> "Choosing organic fruits and vegetables can almost immediately reduce the amounts of residues in a person's body, because the harmful chemicals used on non-organic, or conventional, produce are no longer a factor."

Dirty Dozen 2023

The 2023 shopper's guide includes data from 46,569 samples of 46 fruits and vegetables, revealing the presence of 251 different pesticides in total, including some that have already been banned due to their potential health effects.

In all, nearly 75% of nonorganic fresh produce sold in the U.S. contains residues of one or more potentially harmful pesticides.

A total of 210 different pesticides were detected on the fruits and vegetables on the Dirty Dozen list, and of those, more than 50 were found on every crop on the list with the exception of cherries.

At least one sample of every type of produce on the Dirty Dozen list had 13 or more pesticides. Kale, collard, mustard greens, bell peppers and hot peppers all had detectable levels of 101 to 103 different pesticides.

Strawberries have remained in the number one slot for several years, and that hasn't changed. They're still the most heavily contaminated produce out there. Newcomers on the Dirty Dozen list for 2023 are blueberries and green beans, now ranked as number 11 and 12, respectively.

Here's the full Dirty Dozen list, in order of most contaminated to least contaminated:

1. Strawberries
2. Spinach
3. Kale, collard and mustard greens
4. Peaches
5. Pears
6. Nectarines
7. Apples
8. Grapes
9. Bell peppers and hot peppers
10. Cherries
11. Blueberries
12. Green beans

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80% of blueberries are contaminated

This year, nearly 80% of blueberry samples, which have not made the Dirty Dozen list before, were found to contain two or more pesticides, with traces of as many as 17 additional ones. The two most prevalent pesticides were phosmet (found in 10% of samples) and malathion (found in 9%).

Phosmet and malathion are organophosphates, a class of pesticides known to have toxic effects on the human nervous system. Prenatal exposure has been linked to delayed brain development, reduced IQ and attention deficits.

Symptoms of exposure include weakness, headache, diarrhea, nausea and vomiting. Long-term exposure has been linked to neurological effects, such as confusion, disorientation, anxiety, memory loss, depression and personality changes.

Malathion was also classified as a probable human carcinogen by the International Agency for Research on Cancer (IARC) in 2015.

As reported by the IARC:

> "The herbicide glyphosate and the insecticides malathion and diazinon were classified as probably carcinogenic to humans (Group 2A). …
>
> "Group 2A means that the agent is probably carcinogenic to humans. This category is used when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals.
>
> "Limited evidence means that a positive association has been observed between exposure to the agent and cancer but that other explanations for the observations (called chance, bias, or confounding) could not be ruled out. This category is also used when there is limited evidence of carcinogenicity in humans and strong data on how the agent causes cancer. …
>
> "For the insecticide malathion, there is limited evidence of carcinogenicity in humans for non-Hodgkin lymphoma and prostate cancer. The evidence in humans is from studies of exposures, mostly agricultural, in the USA, Canada, and Sweden published since 2001.
>
> "Malathion also caused tumors in rodent studies. Malathion caused DNA and chromosomal damage and also disrupted hormone pathways."

Some green beans contain banned pesticide

In the case of green beans, more than 70% of samples were found to contain at least two pesticides. Overall, a total of 84 different pesticides were detected.

Six percent contained acephate, an organophosphate pesticide banned by the EPA for use on green beans, specifically, in 2012. Some green bean samples also had traces of pesticides that have been banned in the European Union.

The Clean 15

The 15 fruits and vegetables with the lowest amounts of pesticide residues, making them the safest non-organic options, are:

1. Avocados
2. Sweet corn
3. Pineapple
4. Onions
5. Papaya
6. Sweet peas (frozen)
7. Asparagus
8. Honeydew melon
9. Kiwi
10. Cabbage
11. Mushrooms
12. Mangoes
13. Sweet potatoes
14. Watermelon
15. Carrots

Of these, nearly 65% of samples had no detectable pesticide residues at all, which is good news. Of the top two, avocados and sweet corn, less than 2% of samples had any detectable residues.

Only 10% of the 15 items on this list had residues of two or more pesticides, and none of the samples of the first six items on the list had more than three pesticides.

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Organics are typically more nutritious too

Aside from avoiding toxic exposures, another reason to opt for organic whenever possible is that organic produce tend to have higher nutrient content than conventional varieties.

One reason for this is that nutrient content is largely dictated by the health of the soils in which it is grown.

Synthetic pesticides and herbicides destroy soil microbes and conventional monocultures result in the depletion of soil minerals, while organic foods are typically grown in regenerative agricultural systems that build soil and are replete with micronutrients and healthy microbes.

As a result, organic foods tend to contain more vitamins and minerals than their conventional counterparts.

Studies that have documented noticeable differences in the nutritional composition of organic versus conventional produce include a multi-year study by the Organic Center. Reports of their findings were published in 2008 and 2012.

As noted in their 2012 report:

> "In the Center's 2008 report, New Evidence Confirms the Nutritional Superiority of Plant-Based Organic Foods, we presented research demonstrating that organically grown crops, including grains, have on average higher nutrient contents than those grown conventionally.
>
> "Many variables influence nutrient content, often making it difficult to determine the impact of farming systems on nutrient levels. Thus there are conflicting results about this issue. …
>
> "Matched-pair studies are the best way to control for these variables and to isolate their influences on nutrient content.
>
> "For the 2008 report, The Organic Center developed a rigorous methodology to screen research studies comparing the nutrient content of organic and conventional crops.
>
> "We identified 191 matched-pair studies that met our criteria designed to limit the influence of extraneous environmental and genetic factors on nutrients. These criteria required studies to use the same plant varieties in the same location during the same year.
>
> "Out of these matched pairs, 62% of the organic samples, including fruits, vegetables and a few grains, had higher nutrient levels. Conventional systems had higher nutrient levels in 36% of the matched pairs.
>
> "The average serving of organic plant-based food contained about 25% more of the nutrients encompassed in this study than a comparable-sized serving of the same food produced by conventional farming methods.
>
> "Whereas most of the research conducted five or ten years ago focused on fruits and vegetables, there is now more research on organic grains. …
>
> "These studies support the superiority of organic grains regarding some nutrients, especially antioxidants.
>
> "The differences between organic and conventional grains tend to be less than those found in fruits and vegetables. But overall, there is agreement that consistent differences do exist, especially in antioxidant levels.
>
> "This trend makes sense in light of the effects of conventional high-yield farming methods. …
>
> "Without chemical fertilizers and other inputs, grains grown organically are able to produce healthy roots and develop a more robust array of phytochemicals and micronutrients. …
>
> "The organic crops were significantly higher in copper, magnesium, manganese, zinc and phosphorus. Only calcium was higher in conventionally grown grain."

Other studies showing organics are more nutritious

Similarly, a 2014 meta-analysis of 343 peer-reviewed publications concluded there are "statistically significant and meaningful differences in composition between organic and non-organic crops/crop-based foods," adding:

> "Most importantly, the concentrations of a range of antioxidants such as polyphenolics were found to be substantially higher in organic crops/crop-based foods, with those of phenolic acids, flavanones, stilbenes, flavones, flavonols and anthocyanins being an estimated 19%, 69%, 28%, 26%, 50% and 51% higher, respectively.
>
> "Many of these compounds have previously been linked to a reduced risk of chronic diseases, including CVD [cardiovascular disease] and neurodegenerative diseases and certain cancers, in dietary intervention and epidemiological studies."

They also found that organic foods contain significantly lower levels of the toxic metal cadmium, compared to conventional crops, which is another benefit.

Other studies showing organic foods have higher nutrient levels than their conventional counterparts include a 2010 study, partially funded by the USDA, which found organic strawberries to be more nutrient-rich than non-organic strawberries, and a behavioral study conducted by the Centers for Disease Control and Prevention, which found children with higher levels of organophosphate pesticides in their systems had a higher risk of attention-deficit/hyperactivity disorder (ADHD).

The best long-term solution

Opting for conventional produce that is low in pesticides is a simple way to stretch your food budget, so be sure to bookmark or print out the EWGs Dirty Dozen and Clean 15 lists for easy reference.

The EWG also has a Healthy Living app that you can download. The app provides ratings for more than 120,000 food and personal care products.

Another way to optimize your nutrition and avoid toxic chemicals is to buy produce from a local farmer who might not have organic certification but still uses few or no pesticides in their operation. Alternatively, start growing some of your own food.

Unfortunately, growing a wide variety of fruits, berries and vegetables can be difficult for many. The climate will dictate what can be grown and when, and it typically takes some practice before you can start producing enough for your family's needs.

Few have the "green thumbs" most of our forefathers had. That said, it's certainly worth the effort to learn.

One of the easiest crops to grow long-term is fruit, as once they're established, fruit trees are really easy to maintain. The drawback is it typically takes a few years to start producing fruit, so the sooner you start planting your trees, the better. Of course, you also need to make sure you're choosing fruit trees that will thrive in your growing zone.

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Dr. Joseph Mercola is the founder of Mercola.com.

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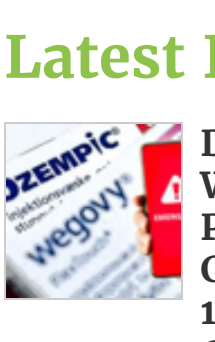
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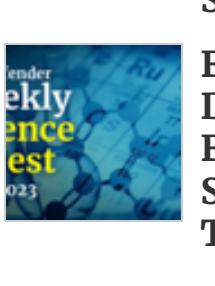
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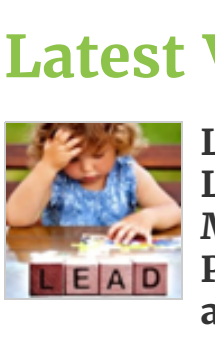
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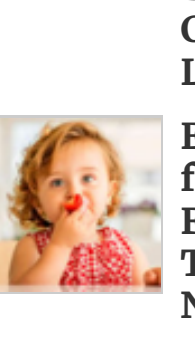
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